The Visual Culture of Brain Imaging

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Abstract

Brain images are believed to be physical explanations for cognitive phenomena. However, the persuasive power of brain imaging cannot be fully explained by the general tendency to biologise the mind in contemporary cognitive sciences. It needs to be understood in relation to histories of imaging techniques, of mediated forms and of their social and cultural discourses.

Keywords: neuroimaging, brain imaging, persuasive imaging, science in culture, public perception of neuroscience

Brain imaging technologies have been embraced by the scientific and medical communities and have reached the public through popular media reports [1]. Brain images are seen as epistemologically compelling [2] and are believed to have a particularly persuasive influence on the public perception of research on cognition [3]. However, there are empirical studies questioning the idea of the popular allure of brain images [4]. In this article I examine some cultural assumptions that underpin this persistent idea.

In the scientific community, brain-imaging data are presented in a variety of ways, the most common being bar graphs and topographical maps. Beauty contests of scientific images, e.g., the Wellcome Image Awards, seem to celebrate the small, such as images of cells of the nervous system. In popular science and in the press, a limited range of visual forms and visualization techniques are chosen to illustrate scientific discoveries. A research article on Alzheimer Disease (AD) may present brain imaging data using a bar chart showing the range of cell counts in different brain regions in gray and white matter, both in control tissue and in tissue from AD patients. Despite the belief that bar charts can communicate scientific data effectively, the main illustration chosen for a popular publication reporting on this research is usually an image of a head from three different views: the profile (sagittal view), frontal (coronal view) or from above (transaxial view), the latter indicating a brain cut through and therefore likely associated with pathology. The first two may indicate a living individual by virtue of their formal similarity to different genres of the portrait, like the ID portrait and the mug shot.

The brain imaging techniques involved seem to be a range of scientifically complex MR, CT and PET scans. What are the cultural assumptions at play when these scans are translated into images of the brain that make it recognizable as human? [5]. Why are they typically used in the popular press? What is the taken-for-grantedness in these iconic images?

In *Picturing Personhood,* Joseph Dumit suggests, "In its popular usage, a brain image is akin to the simplified reality of a graphic cartoon". He refers to Scott McCloud's idea of comics as "a form of amplification through simplification that focuses our attention on an idea" [6]. McCloud uses the form and format of the graphic cartoon to explore the phenomenon of comics [7]. He examines cartooning as a form of amplification through simplification and the ability of cartoons to focus our attention on an idea, but he goes further. "…I believe there's something more at work in our minds when we view a cartoon – especially of a human face – which warrants further investigation" says McCloud's cartoon character. "The fact that your mind is capable of taking a circle, two dots and a line and turning them into a face is nothing short of incredible!" McCloud's storyteller proclaims. "But still more incredible is the fact that you cannot avoid seeing a face here. Your mind won't let you!" A few frames later, this figure stands next to a huge image of a power socket, as if he is giving a lecture about this picture, putting forth the argument: "We humans are a self centered race" [8].

McCloud does not refer to brain images. However, inspired by the comparison with cartoons suggested by Dumit, I propose some very specific features of the popular use of brain imaging as playing a major part in the public perception of research on cognition.

First, visualizations of brain imaging data involving CT, MRI or PET scans are easily translated into views recognized as human due to their typical reference to form, scale, and volume. The familiar shape of the human profile (sagittal view), the quite uncanny appearance of protruding eyes in a face without skin (coronal view), or a picture that cuts across left and right hemispheres (transaxial view) indicating a brain removed during autopsy, all trade on people's familiarity with visual presentations of the human head. Further, in contrast to scientific imaging of nanoscale objects on one hand and objects in the observable universe on the other, the scale of the object in question is very much a *human scale*. Moreover, visualizations of data involving CT, MRI or PET scans often give the impression of three-dimensionality. The grey-scaled or colored scans contribute to a general impression of concreteness, solidity and objecthood [9]. Together, the recognizable imagery, the human scale, and the three-dimensionality contribute to the impression of a *complete* image of the human head.

Secondly, this completeness is strengthened by the common practice of combining several imaging technologies in a compound visualization. The history of medical imaging is normally portrayed as an endless progression of seeing more and better [10]. Various technologies often are combined to provide information of both activity (e.g. PET) and structure (e.g. MRI) [11], resulting in a very complex temporal object [12] that conflicts with the notion of a solid, physical object. Yet practices of combining multiple tools to produce a complex image seem to underpin the popular perception of medical images as letting us *see more* in the same head.

Thirdly, the often extreme, or exemplary, images used in scientific journals to illustrate an argument are presented as representative images when they are shipped over to popular science magazines. They give the impression that we can easily see and understand brain images [13].

In cognitive brain imaging, the whole idea is to use imaging to better understand psychological processes. In the popular perception of research on cognition, brain images are often presented as pictures providing physical explanations for cognitive phenomena. Even if there is no proven causal chain here, it seems reasonable to assume a correlation between physical and psychological conditions. There are historical precedents to this.

In the 19th century, phrenology and physiognomy were interrelated pseudosciences motivated by the desire to classify bodies according to their visual appearance [14]. Phrenology focused on measurements of the human skull, based on the concept that the brain is the organ of the mind and that certain brain areas have localized specific functions. Physiognomy on the other hand was the art of

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judging human character from physical appearance. Both were politically problematic (e.g. racist) [15]. Contemporary brain imaging has acknowledged its proximity to phrenology [16] but not to physiognomy. This essay stresses the importance of historical awareness and highlights the need for a careful political analysis of the contemporary brain imaging enterprise. I suggest that the popular use of brain imaging is rooted in the idea that the physical brain is a more or less direct expression of the mental state, just as our face was supposed to reveal our character. This has political implications.

References

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